Case Report

Primary Actinomycosis of the Hand: A Case Report and Literature Review

Ali Mert, MD;* Muammer Bilir, MD;† Hrisi Bahar, PhD;‡ Muzeyyen Torun, PhD;‡ Fehmi Tabak, MD;* Recep Ozturk, MD;§ Resat Ozaras, MD;† and Yildirim Aktuglu, MD

Primary actinomycosis of the hand is uncommon; 11 cases have been published in the English-language literature through 1998.[1-11] This report presents the clinical, bacteriologic, and pathologic findings and the outcome for a patient with actinomycosis of the hand without known trauma as well as a review of the literature.

CASE REPORT

A 35-year-old male was admitted to the hospital because of a 6-month history of increasing pain, swelling with erythema, and indurated nodules with intermittent discharge on the dorsum and palmar surface of his right hand. The swelling did not interfere with the normal use of his hand. The patient could not recall any specific incident prior to the onset of the swelling and had not taken antibiotics during this period.

Results of the physical examination were normal except for dorsal and palmar swelling and erythema over the second, third, and fourth metacarpals of the right hand. There were three nodules associated with fluctuance surrounded by enduration (Figure 1). No lymphadenopathy in the relevant lymph drainage areas was detected.

Results of laboratory investigations revealed a white blood cell count of 8.7×10^9/L; hemoglobin of 150 g/L; erythrocyte sedimentation rate of 10 mm/h (Westergren method); and a C-reactive protein of 3 mg/L (normal value: 0-5 mg/L). Radiography and magnetic resonance imaging (MRI) of the right hand showed changes consistent with osteomyelitis of the right second, third, and fourth proximal metacarpals (Figures 2 and 3).

The patient was taken to the operating room, and a fluctuant area over the distal portion of the second metacarpal was incised. Serosanginous exudate was taken. Underlying granulation tissue was biopsied and curetted and sent for culturing and histologic examination. Gram stain of exudate and granulation tissue imprinting revealed polymorphonuclear leukocytes with numerous branching, filamentous, gram-positive rods. Anaerobic cultures of these specimens yielded *Actinomyces israelii*. API 20A with SPECTOR MIC (Becton Dickinson Microbiology Systems, Sparks, MD) identification panel was used for *A. israelii* identification. By agar dilution method, *A. israelii* was found to be sensitive to cefotaxime, cefoxitin, chloramphenicol, tetracycline, and penicillin and resistant to metronidazole, clindamycin, and carbenicillin. This result was verified by SPECTOR MIC identification panel. Histologic examination of the subcutaneous tissues specimen was consistent with actinomycosis (Figure 4). Ampicillin was administered intravenously (12 g/d) for a month, then, owing to a negative reaction to ampicillin, doxycycline (200 mg/d) was started and was continued for an additional 11 months. Total cure was achieved with antibiotic therapy.

Figure 1. Dorsum of the patient's right hand.

*Associate Professor in Department of Clinical Bacteriology and Infectious Diseases, †Fellow in Department of Internal Medicine, ‡Associate Professor in Department of Microbiology and Clinical Microbiology, §Professor in Department of Clinical Bacteriology and Infectious Diseases, Professor in Infectious Diseases, Cerrahpasa Medical Faculty, Istanbul University, Istanbul, Turkey.

Address correspondence to Dr. Ali Mert, Cerrahpasa Medical Faculty, Department of Clinical Bacteriology and Infectious Diseases, Kocamustafapasa 34303 Istanbul, Turkey. E-mail: rozaras@yahoo.com.

Figure 2. Radiograph showing the disorganization in both contours and structure of proximal second and third metacarpals on the right hand (findings consistent with osteomyelitis).

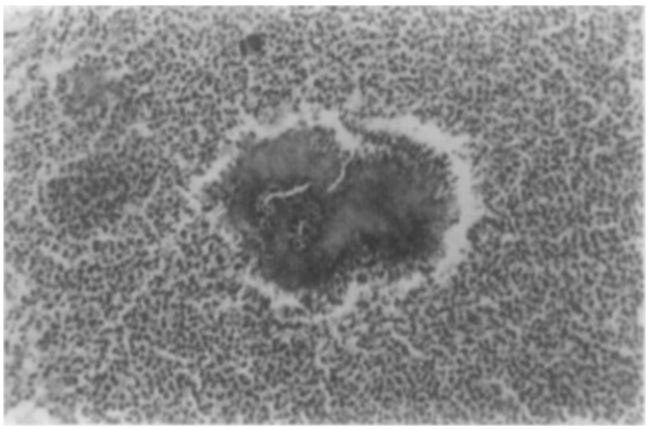

Figure 4. The characteristic granules of *Actinomyces* are enveloped by a dense, purulent exudate. (H&E, original magnification ×200).

DISCUSSION

Actinomycosis of the hand is rare; review of the literature revealed only 12 cases, including the present one (Table 1).[1-11] Although in most reported cases infection developed from a punch injury that occurred when the patient struck an adversary's teeth, there was no history of trauma to the hands in the present case. Punch actinomycosis appears to be restricted to the proximal phalanges and metacarpals, the bones most likely to suffer injury from a punch when the hand is held in a fist. Soft-tissue infection following injury involves bone via contiguous invasion. Actinomycotic osteomyelitis of the hand was first described in 1917 in a case that involved a 20-year-old male.[1]

Histologic diagnosis of actinomycosis is difficult, because many specimens contain only a few granules.[12] Sulfur granules, which are considered to be the hallmark of actinomycosis, were present in every instance except the one reported by Rippey et al. Actinomycotic sulfur granules consist of aggregated microorganisms that are usually yellow. These granules can be identified macroscopically or microscopically in drainage from sinus tracts or other purulent material. Their detection makes the diagnosis of actinomycosis likely. Cultural confirmation of infection is important. The isolation of an agent of actinomycosis from granules or from a sterile site confirms the diagnosis. Microbiologic identification is possible in only a minority of cases because of prior antimicrobial therapy. Primary isolation usually requires 5 to 7 days but may take as long as 2 to 4 weeks. *Actinomyces israelii* was isolated in all patients except the one reported by Rippey et al. In the present case, sulfur granules were detected in the tissue, and *A. israelii* was isolated in the culture. The clinical experience with actinomycosis has been extensive and supports the use of penicillin G and ampicillin as the drugs of choice for all clinical forms of the disease.[12-14] For penicillin-allergic patients, tetracycline, erythromycin, and clindamycin are suitable alternatives.[12-14] Owing to the potential for relapse of actinomycosis, prolonged antibiotic treatment is prudent. Penicillin should be administered parenterally in high doses initially. Oral therapy should be continued for an additional 6 to 12 months depending on the original site of infection and the clinical response. In a case of 54 years' duration of actinomycosis reported by Musher,[11] after several months' treatment of erythromycin, oral penicillin, tetracycline, or clindamycin, the patient has been receiving oral penicillin for 1 year. Although partial improvement had been achieved within 4 months, the treatment was continued to 1 year. The condition of the patient was essentially unchanged after this treatment period; therefore, ongoing penicillin treatment for indefinite duration was planned. Therapeutic success in cases reported by Burrows and Rushforth and Eykyn may be explained by successful débridement and

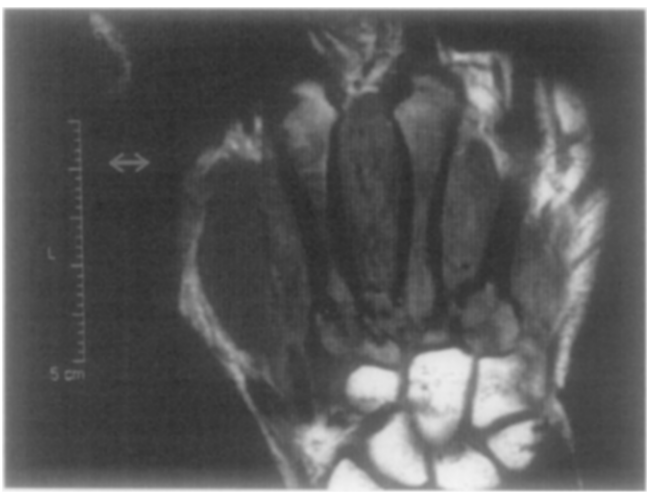

Figure 3. Pathologic signal changes on MRI in spongious bone of entire second, third, and fourth metacarpals (involvement of the bone).

Table 1. Cases of Primary Actinomycosis of the Hand Reported in the English-Language Literature

Year	Age (y) Gender	Bone(s) Involved	Mechanism of Infection	Culture Verification	Sulfur Granules	Therapy	Outcome
1917[1]	20 Male	Third proximal phalanx	Punch injury	No	Present	Amputation	Cured
1945[2]	26 Male	Fourth metacarpal	Punch injury	No	Present	Potassium iodide, sulfonamide, surgical debridement	Cured
1959[3]	42 Male	Radius, carpal bones	Unknown	*A. israelii*	Present	Penicillin, sulfonamide	Cured
1960[4]	NA Male	Second proximal phalanx	Punch injury	*A. israelii*	Present	Penicillin, surgical débridement	Cured
1960[5]	46 Male	Second proximal phalanx	Punch injury	*A. israelii*	Present	Penicillin, surgical débridement	Cured
1965[6]	25 Male	Fifth metacarpal	Punch injury	*A. israelii*	Present	Tetracycline, potassium iodide, surgical débridement	Cured
1979[7]	31 Male	Second metacarpal	Punch injury	*A. israelii*	Present	Penicillin, surgical débridement	Cured
1982[8]	67 Male	Ulna, scaphoid, capitate	Trauma	*A. israelii*	Present	Sulfonamide, surgical débridement	Cured
1988[9]	51 Male	Second metacarpal	Punch injury	*A. israelii*	Present	Penicillin, surgical débridement	Cured
1998[10]	41 Male	None	Punch injury	No	Not known	Penicillin, surgical débridement	Cured
1998[11]	72 Male	Metatarsals and proximal phalanges	Trauma	*A. israelii*	Present	Erythromycin, tetracycline, clindamaycin, penicillin (mainly)	Ongoing
Present case	35 Male	Second, third, and fourth metacarpals	Unknown	*A. israelii*	Present	Ampicillin, doxycycline, surgical débridement	Cured

the effect of sulfonamides.[2,8,15] A combined medical-surgical approach is frequently required for actinomycosis. In the majority of cases and also in the present case, the therapy consisted of surgical debridement combined with prolonged antibiotic therapy. With this approach, a successful outcome was attained in every case.

CONCLUSION

Increased awareness of actinomycosis, especially following punch injuries, is required in the differential diagnosis of any subacute or chronic inflammatory lesion involving soft tissues and progressing to osteomyelitis in the hand.

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